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3849-301 MAY 2019
Level 3 Certificate in Using and Applying Mathematics
Paper 1: Mathematical Modelling
Written

If provided, stick your candidate barcode label here.

Wednesday 15 May 2019
09:30 – 11:00

Candidate name (first, last)

First

Last

Candidate enrolment number

Date of birth (DDMMYYYY)

Gender (M/F)

Assessment date (DDMMYYYY)

Centre number

Candidate signature and declaration*

- If additional answer sheets are used, enter the additional number of pages in this box. 0 0
- Before taking the examination, **all candidates** must check that their barcode label is in the appropriate box. Incorrectly placed barcodes may cause delays in the marking process.
- Please ensure that you staple additional answer sheets to the **back** of this answer booklet, clearly labelling these with your full name, enrolment number, centre number and qualification number in BLOCK CAPITALS.
- All candidates need to use a **black/blue** pen. **Do not** use a pencil or gel pen, unless otherwise instructed.
- If provided with source documents, these documents **will not** be returned to City & Guilds, and will be shredded. Do not write on the source documents.

***I declare that I had no prior knowledge of the questions in this examination and that I will not divulge to any person any information about the questions.**

You should have the following for this examination
- a clean copy of the pre-release material
- pen with blue or black ink
- pencil
- 30 cm ruler
- calculator
- graph paper.

General instructions
- There are **45 marks** for this paper.
- You have 1 hour 30 minutes to complete this paper.
- Answer all of the questions.
- Write all working out and answers in this booklet.

You may use
- A scientific or graphical calculator.
- A PC installed with the following standard application office software
  – word processor
  – spreadsheet
  – database
  – graphics and presentation packages.

You must not use
- internet
- email
- internal or externally saved files
- mobile phones.

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Paper 1: Mathematical Modelling

Refer to *The Law of Retail Gravitation* in the pre-release material.

The diagram below shows the approximate direct distances between the cities that are considered to form the Northern powerhouse.
The table gives the approximate populations of the cities.

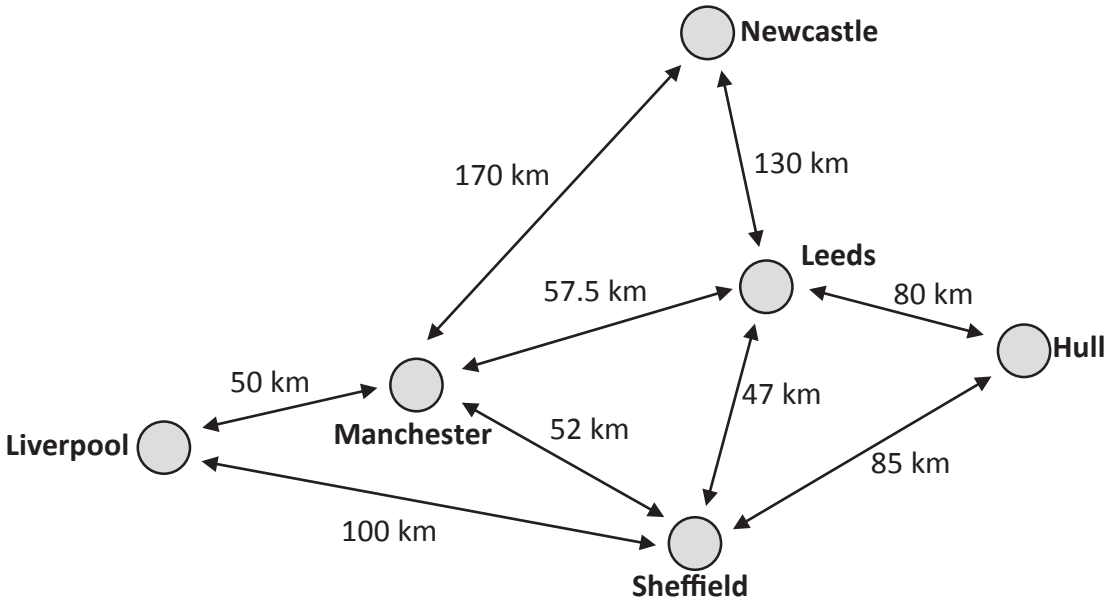
Use The Law of Retail Gravitation to explore how people might choose to go shopping if they live in the area of the Northern Powerhouse.

Additionally, explore what might happen if the city of Leeds grows much larger.

Remember to explain clearly any assumptions that you are making.

Use between one and two sides of A4 for your answer.

(45 marks)



City	Approximate population
Hull	260,000
Leeds	475,000
Liverpool	493,000
Manchester	545,000
Newcastle	309,000
Sheffield	575,000

There is space on the following pages. Use this to show your workings.
Additional inserts/printouts can be used and should be included.

End of Paper 1.